

Proactive Personality Heterophily and the Moderating Role of Proactive Personality on Network Centrality and Psychological Outcomes: A Longitudinal Study

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Abstract

Purpose In a social network study, this research investigates proactive personality dissimilarity as a basis for friendship ties over time. It also examines the moderating role of proactive personality on the relationship between network centrality and satisfaction/stress.

Design/Methodology/Approach Longitudinal network data (two periods) were collected from business students (T1, $n = 197$; T2, $n = 212$). We captured the early stages of network formation and observed the changes in network structure over time.

Findings Findings demonstrate proactive individuals develop ties with less proactive individuals over time, providing evidence of personality heterophily. In addition, proactive personality positively moderates the relationship between network centrality and satisfaction/stress. Interestingly, people's perceptions of their network position (out-degree ties) were more strongly associated with their personal outcomes than their number of ties as nominated by others.

Originality/Value This research is among the first to provide evidence of personality heterophily over time (relationships form because of differences in personality). Moreover, proactive personality is important to both the benefits and costs associated with network participation, pointing to paradoxical effects of proactive personality.

Keywords Social networks · Network centrality · Proactive personality · Satisfaction · Stress

In a longitudinal social network study we seek to understand the linkages between proactive personality and informal social networks. Within the emerging research on social networks and personality (Mehra et al. 2001; Klein et al. 2004), we study the role of proactive personality in social networks as both theory and empirical research suggest that proactive personality may influence the pattern of social networks and network outcomes. Proactive personality is defined as the “relatively stable behavioral tendency” to bring about environmental change (Bateman and Crant 1993, p. 104). Proactive personality is related to engagement in networking behaviors (Thompson 2005) and to the best of our knowledge (also see, Kilduff and Brass 2010) it has not been examined in social network research.

The linkages between personality and social networks can be examined from a variety of perspectives. For example, personality can be examined for its role in shaping network centrality or as an antecedent to network centrality. Indeed, prior research has identified the relationship between self-monitoring personality orientation (Mehra et al. 2001), extraversion, and neuroticism (Klein et al. 2004) and network and team centrality. Personality has also been examined for its influence in shaping the

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benefits/costs of central positions in social networks. Such an examination may involve testing for the moderation effects of personality on the relationship between network centrality and network outcomes. In other words, do individuals with certain personality traits realize greater benefits and/or bear higher costs from occupying central social network positions? Moreover, similarity in personality can be examined as a basis for friendship tie formation. That is, do individuals with similar personality form (or not form) friendship ties with similar others? In this paper, given the limited research in this important area, we seek to examine the role of proactive personality as a moderator of the relationship between network centrality and two important outcome variables (satisfaction/stress) as well as examine proactive personality similarity as a basis for the formation of friendship ties. Below, we discuss the rationale for our research in greater detail.

Gibbons and Olk (2003), in a longitudinal social network study, identified attribute similarity as an antecedent to friendship tie formation in a developing network. For example, similarity in gender predicted the likelihood of the formation of a friendship tie at a later time. Likewise, similarity in work experience and education predicted the formation of friendship ties in a developed network at a later time. This finding in a longitudinal study is consistent with a large body of research on homophily which identifies attribute similarity as a basis for friendship ties (Brass 1985; Mehra et al. 1998; Ibarra 1992, 1993; see McPherson et al. 2001 for a review). Building on this body of research, we examine if similarity in proactive personality influences the likelihood of friendship tie formation at a later time. Or alternatively stated, does proactive personality influence the pattern of social tie formation such that, over time, high/low proactive individuals are more likely to form friendship ties with other high/low proactive individuals? Drawing on prior research and from theoretical perspectives on stress, including the conservation of resources perspective (Hobfoll 1989) and the demand–control model of workplace stress (Karasek 1979; Rubino et al. 2012), we argue that proactive personality similarity is likely lower rather than enhance the likelihood of friendship ties in a developed network at a later time.

Further, past network research identifies several psychological and job related outcomes of centrality in friendship networks (see Brass 2012 for a review). More specifically, prior research purports centrality in friendship networks predicts important outcomes such as job performance (Mehra et al. 2001), creativity (Perry-Smith 2006) and satisfaction in an academic program (Baldwin et al. 1997). In Baldwin et al.'s study, students who were identified as being more central in the friendship network experienced greater satisfaction in the MBA program. While they did not empirically test this relationship,

Baldwin et al. (1997, p. 1372) indicate that friendship networks may be important “in dealing with the stresses... of negotiating a demanding education program.” Implied in their reasoning is the idea that central actors in the friendship network have access to greater psychosocial support. Such support may enable these central actors to better cope with the stresses of the academic program, and thus, centrality may be tied to lower stress. On the other hand, central actors in friendship networks may perceive the potential for higher resource loss and face time demands from a larger number of friends, and coping with cumulatively greater demands may be difficult (Hobfoll 1989; Karasek 1979; Rubino et al. 2012). Consequently, centrality may be tied to higher stress. Given these competing lines of reasoning, we empirically investigate the relationship between centrality in friendship network and stress. Further, Baldwin et al. (1997) identified a positive relationship between network centrality and satisfaction but noted that their cross-sectional research design is a limitation that needed to be addressed in future research. In the current paper, we examine the persistence of the centrality–satisfaction relationship in an academic program using a longitudinal design.

In addition to testing the main effects of network centrality on satisfaction/stress, we examine the role of proactive personality in influencing the relationship between network centrality and satisfaction/stress. Testing the moderation effects is an important goal of our research as prior research, while identifying linkages between centrality and key psychological and job related outcomes, has paid limited attention to the boundary conditions under which such relationships hold. In particular, past research has given limited attention to the role of personality as a moderator of the relationship between network position and outcomes (for a rare discussion on a personality linked moderation model in social network research, see Mehra et al. 2001). Yet, personality driven moderation models are central to addressing the key debate regarding whether the benefits of social networks are rooted in their structure. Some have argued that the benefits of social networks are structural (Wellman and Berkowitz 1988; White 1992), and that individual differences are immaterial for differentially realizing network benefits. Others suggest that individual differences matter (e.g., Kilduff and Krackhardt 1994) in the realization of benefits from social networks. Indeed, proactive individuals seeking to drive environmental change, we argue, may draw more benefits and bear higher costs from holding central positions in social networks than their less proactive counterparts. Thus, with the goal of advancing research in this area, we examine proactive personality as a moderator of the relationship between network centrality and stress/satisfaction using a longitudinal design.

In sum, in a social network study, we examine proactive personality similarity as a basis for the formation of friendship ties over time. In addition, we examine the direct relationships between centrality in friendship networks and satisfaction/stress as well as the role of proactive personality as a moderator to the relationship between centrality in friendship networks and satisfaction/stress.

Personality Similarity and Friendship Development

Past research identifies similarity in demography, values, and education as predictors of the formation of friendship ties. While such similarities indeed facilitate friendship tie formation, we suggest that similarity in proactive personality does not enhance but reduces the likelihood of friendship tie formation in a developed network at a later time. Resource-based theories of workplace stress provide the conceptual foundation for this prediction. Below, we discuss our rationale in greater detail.

Theory suggests that social networks generate resource flows for participants; hence, resource-based theories of stress are highly relevant to social network research. The expanded demand–control model of stress (Karasek 1979; Rubino et al. 2012) argues that stress increases as demands on the person increase, and that resources are required to reduce the detrimental effects of too many demands. Conservation of resources (COR) theory (Hobfoll 1989, 2001) argues that people seek to build and protect their store of resources in order to maximize the ability to face challenges and stressors in life. Such resources include time, energy, and personal capabilities as well as material resources and social support. Stress results in three situations: (1) when resources are lost, (2) when resources are threatened with loss, and (3) when resource investments do not generate the expected level of returns (Hobfoll 1989).

According to the stress models outlined above, forming ties with other proactive personalities can be burdensome for proactive individuals. For instance, proactive individuals are likely to be constant targets of requests for information and resources, hence demand pressures increase as a result of their personality. In addition, other proactive personalities, as seekers of resources and opportunities, may initiate more requests than others, further burdening proactive individuals in their network. Thus, given the potential for increased stress, proactive individuals are likely to avoid forming ties with other proactive individuals. In other words, we expect the emergence of personality heterophily (differences in personality motivating ties) such that over time, proactive individuals will form ties with those lower on proactivity.

Previous research has shown that highly proactive personalities actively engage with their surrounding environment and

have a strong need to shape their environment (Bateman and Crant 1993). Proactive individuals tend to expand their role requirements and go beyond the expectations of their formal responsibilities in order to influence their context (Seibert et al. 1999). However, it may be difficult for proactive individuals to influence others who also have the desire to be change agents and who may have competing visions. It is not necessary that multiple highly proactive individuals join together to enable a focal proactive individual to bring about a desired environmental change. In fact, less proactive individuals who do not have competing visions might be better relationship partners. Specifically, proactive individuals may avoid having ties with other proactive individuals who may have different perspectives on environmental change in the same shared context, as forging such ties may create conflicts in vision and competition for resources which consequently may yield fewer benefits. Potential conflicts of territoriality (e.g., Brown et al. 2005) may also arise with other such highly proactive individuals. Thompson (2005) suggests that proactive individuals work to establish a strong supportive network to affect change within the organization, and it is important for proactive personalities to be selective in choosing supportive friends who may enable the implementation of their vision of environmental change. Thus, we predict that proactive individuals are less likely to form ties with other proactive personalities. Together, we provide the following hypothesis:

H1 Proactive individuals form ties with less proactive individuals over time.

Network Centrality in Friendship Networks and Satisfaction/Stress

Centrality in friendship networks plays a crucial role in shaping individual and organizational outcomes. The measure of centrality that considers only direct relationships to the focal individual is known as degree centrality; it is a widely used measure of centrality for network research (Burkhardt and Brass 1990; Klein et al. 2004; Sparrowe et al. 2001). Individuals with higher number of direct relationships (high degree centrality) have been shown to have relatively quick access to information, more accurate perceptions of the network, and greater power and influence (Brass and Burkhardt 1993; Casciaro 1998). Direct friendship relationships can be further broken into two types: (a) direct friendship ties that a focal individual *sends out* to other individuals in the social network and (b) direct friendship ties that a focal individual *receives* from other individuals in the social network (Freeman 1979). Simply, outgoing friendship ties captures the out-degree centrality of a focal individual in a social network

while incoming friendship ties capture the in-degree centrality of a focal individual in a social network.

The two measures of degree centrality are conceptually different in important ways (Freeman 1979). Specifically, the difference between out-degree and in-degree centrality concerns the difference between social perceptions and social reality. The reflection–construction model (Jussim 1991) is a useful theory for understanding the relationship between perceptions and reality. The model emphasizes that social reality is derived from social perceptions. Perceptions are important because to a large extent, individuals create their own realities through self-fulfilling prophecies that solidify social beliefs, expectations, stereotypes, and schemata. For example, Lee et al. (2010) point out that out-degree centrality is related to subjective opinion leadership, while in-degree centrality is related to opinion leadership as perceived by others. Regardless of what the social reality is, individuals behave according to their social perceptions, and eventually, as others respond to their behaviors, people's social realities evolve to match their perceptions. As a result of the fact that social perceptions are self-sustaining, social perceptions influence individual outcomes more proximally than social realities do. In the context of social network research, the reflection–construction model implies that over time, out-degree centrality rather than in-degree centrality is likely to show a stronger association with individual-level psychological outcomes (e.g., satisfaction, stress). This logic parallels a recent finding in literature that differentiates subjective from objective views of networks as drivers of individual outcomes (e.g., Hayward and Elliott 2011). Herein, we focus primarily on out-degree ties (perceptual measure of network centrality).

Network Centrality and Stress/Satisfaction

As suggested earlier, the relationship between centrality in friendship networks and outcomes may be influenced by competing forces. On one hand, as Baldwin et al. (1997) have implied in their reasoning, central actors in the friendship network may have access to greater psychosocial support and such support from friends may lower stress. However, networks are also sites of conflicts. Gest et al. (2001) found that, while having many friends was associated higher prosocial skills (e.g., good sense of humor), it was also associated with negative behaviors such as bossiness, teasing others, and showing off. Antonucci et al. (1998) reported lower happiness among individuals who perceived that they had more friends dependent upon them and who felt their network was too demanding. Moreover, the need to manage overly large amounts of information has been identified as a stressor (Bartoo and Sias 2004), and network centrality may lead to stress from

information overload, especially in large, active networks. In additionally, making decisions can be stressful, and the added information associated with network centrality is likely to create a relatively high number of decision-making opportunities. Too many decision opportunities result in stress (Mick et al. 2004) because they increase cognitive load by requiring consideration of multiple, overlapping, and possibly interacting factors (Sikora et al. 2004). Hence, we predict higher out-degree centrality is positively associated with stress.

H2 Out-degree centrality is positively associated with stress.

Baldwin et al. (1997, p. 1373) suggest that being central in informal friendship networks would lead to access to a “broad base of psychosocial and social resources and is likely to enhance an individual's enjoyment of whatever situation he or she is in.” Consequently, central actors in friendship networks are likely to have greater satisfaction in an academic program. Centrality may also indirectly influence satisfaction as centrality brings access to information, resources, and influential opportunities (Lee et al. 2010). Consequently and consistent with prior literature, we hypothesize,

H3 Out-degree centrality is positively associated with satisfaction.

Moderating Role of Proactive Personality on the Relationship Between Network Centrality and Stress/Satisfaction

We expect proactive personality to moderate the relationship between network centrality and stress such that this relationship will be stronger for highly proactive individuals than for less proactive individuals. Again, we draw on the resource-based theories of workplace stress outlined earlier to provide the conceptual platform for this prediction.

There are many reasons to believe that proactive behaviors will be associated with increased resource flows and resulting stress for participants in social networks. Proactive behavior is linked to attempts to change the environment for personal benefit. In a social network, proactive behavior is likely to be associated with more attempts to influence and seek resources from network contacts in order to affect the surrounding environment. Consequently, this higher level of activity within the social network has the potential to increase demands on the individual and erode his or her resource base. This outcome can occur because proactive attempts to garner resources from the network may trigger social exchange processes.

This is especially true for proactive individuals occupying central positions where social exchange is more prominent. Social exchange activates reciprocity norms resulting in the need to provide resources to others in order to maintain relationships (Buchan et al. 2002). Hence, tapping into the benefits of one's social network requires people to reciprocate and share resources with others, which increases demands on the individual. The demand pressures become greater for central proactive individuals as they have more relationships they attend to. As a result, when the resource losses resulting from unmanageable demands outweigh the resource gains accrued from higher levels of social exchange this depletion results in stress. When reciprocity demands increase to the point where they become difficult to manage (Rubino et al. 2012), the need to manage a high number of social exchange transactions increases the demanding nature of the situation, further increasing stress.

Moreover, such demands are most likely to become unmanageable for highly proactive individuals who are central in a large and active social network. The higher levels of activity exhibited within the network by central individuals result in greater visibility. Visibility means being recognized as an environmental change agent and is likely to be associated with criticism linked to resistance to change, particularly when change threatens individual self-concepts (Eilam and Shamir 2005). Threats to self-concepts can easily arise when individuals view proactive behavior as competing for influence and position within a social network. Dealing with critics and managing resistance to change result in further demands on the person (Karasek 1979; Rubino et al. 2012), increasing the likelihood that activity reaches the point where personal resource losses outweigh gains, resulting in depletion and stress. Those lower in proactivity are less likely to experience demands from their network (despite occupying central positions) due to their non-active nature and lack of attempts to shape the environment (Bateman and Crant 1993); they are less likely to attract attention, debate, and criticism, facing less pressure from the network.

Furthermore, proactive attempts to influence the social network arise from heightened expectations that one can produce desired outcomes (Crant 2000). The COR theory argues that stress results when investments fail to generate expected levels of rewards (Hobfoll 1989, 2001). Failure to meet these expectations implies individuals are more likely to be susceptible to stress. Hence, the high expectations associated with proactivity may increase the likelihood of experiencing stress because high levels of expected outcomes can mean that the payoff from network investments must be substantial for the proactive individual to avoid disappointment. The combination of high expectations regarding the ability to garner desired resources, the

activation of reciprocity norms which increases demands to provide resources for network contacts, and heightened visibility as an active network member and the associated potential targeting for criticism is particularly charged for proactive individuals who are more central in the social network. Network centrality implies that more contacts are available, and proactivity will be associated with attempts to engage with a larger proportion of potential contacts. Influencing a larger number of contacts triggers more social exchange processes, resulting in a larger number of transactions and reciprocity demands to be fulfilled. As the number of exchanges increases with higher proactivity and with greater network centrality, visibility as a change agent heightens, along with criticisms and resistance to change. Criticism is increasingly likely with both high proactivity and high centrality, with resulting increase in demands and danger that personal resource losses will outweigh resource gains and result in depletion.

Finally, the stressful nature of the combination of increasingly high proactivity and centrality will be especially apparent in later stages of network development after individuals have had multiple exchanges with their network ties. Multiple exchanges clarify patterns of proactivity and centrality in the social network, potentially enhancing both reciprocity expectations and criticisms. With time, the unrealistic nature of very high expectations also becomes more apparent. In sum, we predict:

H4 Proactive personality positively moderates the relationship between out-degree network centrality and stress in a developed network.

We expect that proactive personality will moderate the relationship between network centrality and satisfaction for two important reasons. First, proactive personality is likely to be associated with selecting contacts with the capacity to generate individual benefits. As part of selecting and creating situations that enable environmental change, connecting to individuals who have access to the most resources is an important means of garnering personal satisfaction (Belliveau 2005; Seidel et al. 2000). Because proactive personality is associated with the desire to shape one's environment, it significantly influences the way people interact and build relationships with others. One of the most important factors in any social context is often the network of coalitions and relationships among individuals, and for this reason, proactive personality is likely to have a major influence on how people select others to make friendship connections. Indeed, networking behaviors that show active engagement in the choice of relationship partners is related to proactive personality (Thompson 2005). Hence, given that proactive personality is likely to be associated with connections that generate greater benefits and bring access to crucial resources to the focal

individual, occupying a central network position is likely to generate greater satisfaction for proactive individuals. Hence, a crucial reason proactive personality moderates the association between centrality and satisfaction is because given the same level of centrality, proactive personality is associated with a set of higher information- and benefit-generating network connections.

Second, understanding one's network position has a significant effect on the likelihood of gaining positive outcomes from the network (Casciaro 1998). Proactive personality is likely to be associated with greater understanding of the network and one's own position within the network. More specifically, proactive personality leads individuals to be highly interactive (Thompson 2005), and purposeful interactions bring individuals greater access to the information held by their ties. For instance, proactive personality is positively associated with the extent to which individuals proactively engage in conversations with people and issues that help them to understand their network better. Hence, proactive personality is associated with greater understanding of the network situation, due to both connections with information-rich ties and more purpose driven interactions with those ties. This greater understanding means that at any given level of centrality, proactive personality will be associated with obtaining better information regarding the mechanisms to gain satisfying resources, opportunities, and rewards.

The moderating effect of proactive personality, however, will only obtain once the network has become more fully developed. Individuals cannot utilize social network resources until they have established their credibility and identity within the network. Over time, members of the social context become more aware of who is more central and important. People also gain a better understanding of their network assets over time, which helps them to become more strategic about managing their relationships and exploiting opportunities. In other words, the satisfaction accruing from building networks do not materialize immediately, but in a later period when the network and the individual's network position have become more established. In sum, we predict the following:

H5 Proactive personality positively moderates the relationship between out-degree network centrality and satisfaction in a developed network.

Methodology

Participants and Procedure

To test our hypotheses, we collected longitudinal data from an incoming cohort of 300 honors business students at a

leading business school in Canada. The program is considered to be an elite program which admits high performing students after 2 years of undergraduate studies. Program statistics show that the sample of upper-year undergraduate students is composed almost exclusively of students age 19–21, with a few participants in their early 20s and no students of non-traditional age. Because the students study together as a cohort in a lock-step program for the first year, we were able to capture early stages of their network formation and observe the changes in network structure over time.

We collected social network data at two points in time. At both times, an online questionnaire was prepared for 300 students at the conclusion of one of their core classes. This allowed maximum participation as we were able to enter each of the classrooms and distribute the link which gave the students access to the online survey. To encourage participation, we provided incentives (pizza lunch and \$10 gift) to the students. Time 1 (T1) data were collected approximately 4 weeks after the start of the program to allow participants enough time to have some perception of their social network. Time 2 (T2) data were collected when the participants were approximately 4 months into the program.

At T1, 197 of 300 students (response rate of 65.6 %) provided usable data for analysis. At T2, 212 of 300 (response rate of 70.7 %) students provided usable data for analysis. We calculated network centrality from the data provided by all respondents in order to get the most accurate picture possible of the network structure and individual's centrality score for each time frame. However, to insure the explicit comparison of results between the two time periods, we included only those 159 students who responded at both points in time in our hypothesis-testing analyses.

Measures

Network Data

Network data were collected using the roster method (Scott 2000; Wasserman and Faust 1994). Students were provided with an alphabetical listing of the names of all of their classmates and asked to indicate their degree of friendship with each name on the list. The roster method is widely used in social network research (e.g., Gibbons and Olk 2003) and it is strongly preferred over alternative methods (i.e., asking participants to generate the names of their network contacts) because name generators suffer from recall bias.

At the beginning of this particular program, students are assigned to one of four sections. Each section holds 75 students and they take all of their classes together in their

assigned sections. As such, students do most of the assigned educational activities with their section mates, consequently building friendship ties in the process. In collecting our data, instead of providing students with a list of 300 students, we deployed an alternative protocol to minimize participant fatigue. We used the roster method to assess friendship ties with each and every person in the same section (“don’t know”, “friend”, and “close friend”). Then, we provided additional space to indicate any friends (maximum of 30) in other sections along with an alphabetical listing of all students in all other sections to facilitate recall of all friendship ties in this large network. In this way, we insured that each and every student in the pool of 300 had a chance to be selected by the respondent without requiring responses to several questions about all 300 people. At T1, the average number of students nominated from other sections (as a friend or as a close friend) was 8.87 (range 0–16), whereas at T2, the average was 9.32 (range 0–15). Hence, none of the students had enough friends from other sections to fill all 30 extra spaces, and our format was ample for reflecting the structure of this student network.

Some might argue that a stronger data collection methodology would have been to provide each respondent with the full roster of 300 students rather than asking students to select names of friends outside their assigned sections. Increasing the length of the survey was not a realistic option, however, given that our response rate was only adequate for the analysis of the network structure (~70 %). Both high quality data and high response rate are needed for the analysis of network structures, and our data collection method provided a reasonable balance in the inevitable trade-off between construct validity of the network measure and response rate.

Degree Centrality

We used the friendship data to calculate each participant’s out-degree and in-degree centrality scores. Out-degree centrality was calculated by counting the number of people that the focal individual nominated as close friends. In-degree centrality was calculated by counting the number of participants who nominated the focal individual as a close friend. We chose close friend as our level of analysis, as it represents the strongest ties between participants. Both degree centrality measures were calculated utilizing the full dataset at both T1 ($n = 197$) and T2 ($n = 212$).

Proactive Personality, Stress, and Satisfaction

We used Seibert et al.’s (1999) 10-item measure of proactive personality (PP), which is a shortened version of the measure developed by Bateman and Crant (1993). Seibert et al. reported a Cronbach’s alpha of 0.86 for this 10-item

index. Their measure also demonstrated discriminant validity from measures of neuroticism, openness, agreeableness, intelligence, private self-consciousness, and locus of control. The 10-item PP index was scored on a 7 point Likert-type scale ranging from 1 to 7 with descriptive anchors “Strongly Disagree” and “Strongly Agree”. Sample items on the scale included, “If I believe in an idea, no obstacle will prevent me from making it happen,” and, “I can spot a good opportunity long before others can”. We assessed PP at T1, and the Cronbach’s alpha reliability for the measure in our data was 0.87. We did not measure PP again at T2 because conceptually, it is a stable trait that does not change substantially over time, and because methodologically, it was important to minimize survey length and respondent fatigue.

Stress was measured using a scale adapted from Motowidlo et al. (1986) and more recently used in Bolino and Turnley (2005). This 4-item scale was scored on a 7 point Likert-type scale ranging from 1 to 7 with descriptive anchors “Strongly Disagree” and “Strongly Agree”. Sample items on the scale included, “I feel a great deal of stress in the program” and “Very stressful things happen to me at this program”. Cronbach’s alpha for the 4-item measure of stress was 0.83 at T1 and 0.76 at T2.

We assessed satisfaction using a 6-item expanded version of the scale developed by Baldwin et al. (1997). These authors assessed satisfaction with team-based learning and satisfaction in a business education program. We added several other items to capture other dimensions of satisfaction (e.g., satisfaction with the social opportunities). The response categories ranged from 1 “Strongly Disagree” to 7 “Strongly Agree”. Sample items on the scale included, “I am satisfied with the Y program at the X Business School”, “I am satisfied with the team-based learning approach at the X Business School”, “I am satisfied with the social opportunities at the X Business School”, “I am satisfied with the learning opportunities at the X Business School”, “I am satisfied with my fellow students at the program at the X Business School”, “I am very likely to recommend the Y program to a friend with similar career interests” (Y—refers to the name of the academic program; X—refers to the name of the Business School). The Cronbach’s alpha for the 6-item measure of satisfaction was 0.83 at T1 and 0.91 at T2.

Data Analyses

To test H1, we used Simulation Investigation for Empirical Network Analysis (SIENA) implemented in the R-environment: RSiena and RSienaTest 1.1-220 (Snijders et al. 2007; Ripley et al. 2012). SIENA allows us to observe the rate of change in the network from T1 to T2 as well as the role of similarity in PP in the formation of social ties (Boer

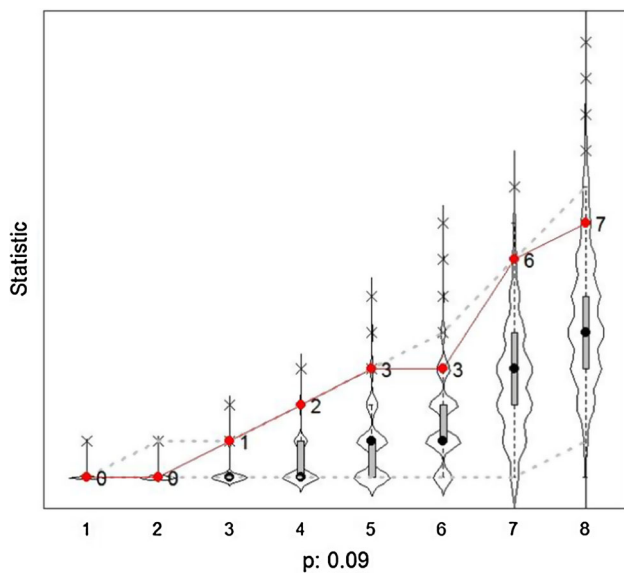


Fig. 1 Goodness of fit of in-degree distribution

et al. 2007) and can be used to carry out statistical estimation of dynamic actor-driven models. We ran the model with convergence diagnostics, covariance and derivative matrices based on 5,000 iterations. To determine changes in the network over time, we observed the basic network rate parameter (e.g., Steglich et al. 2006).

We assessed goodness of fit using the in-degree distribution and out-degree distribution as auxiliary statistic (see Figs. 1, 2) of a Monte Carlo Mahalanobis Distance Test (Lospinoso and Snijders 2011). Results indicate that goodness of fit is moderate for in-degree distribution (Mahalanobis distance = 16.306; $P = 0.090$) and good for out-degree distribution (Mahalanobis distance = 14.947; $P = 0.166$).

The relationship between PP and network ties over time is indicated in SIENA by the PP parameters. SIENA analysis considers ties from both directions (out-degree and in-degree ties). To test our hypothesis, we consider the similarity effect (Burk et al. 2007). Specifically, a positive (negative) similarity effect would mean that individuals form friendships with other similar (dissimilar) proactive personalities (i.e., homophilous selection) over time.

To observe the effects of PP, we controlled for the effects of transitivity, reciprocity, out-degree, 3-cycles, and out-out degree assortativity in our SIENA analysis¹ (for more detailed info, please see Snijders et al. 2007). Three actors (A, B, C) are transitive if A is linked to B, B is linked to C, and C is linked to A. Transitivity is the number of transitive triples divided by the number of potential transitive triples (number of path combinations possible).

¹ The Jaccard Index (Batagelj and Bren 1995) was 0.436, which indicates the change process was gradual (Snijders et al. 2010).

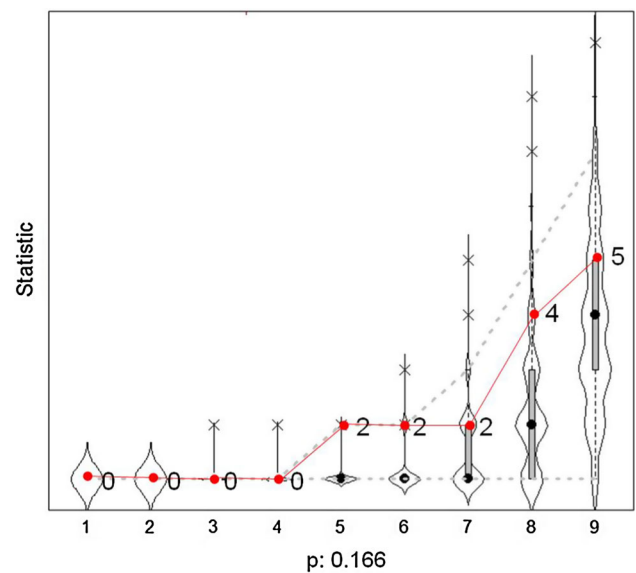


Fig. 2 Goodness of fit of out-degree distribution

Reciprocity is the extent to which a relationship is bi-directional, that is, if A deems B as a close friend, is B also likely to deem A as a close friend. The out-degree effect is the degree to which actors tend to establish friendships with anyone. The 3-cycles effect represents cyclicity, or generalized reciprocity, or the converse of hierarchy. Lastly, out-out degree assortativity measures the extent to which network nodes with high out-degree ties attach to others that also possess high out-degree ties. We controlled for these factors as these variables are known to naturally occur in networks (Brass et al. 2004; Wasserman and Faust 1994). These controls were necessary to insure that the effects of PP were unique from these potentially confounding factors.

To test H2–H5, we analyzed the data using structural equation modeling (SEM) (Kenny and Judd 1994). As the model contained multiple dependent variables, structural equation modeling was more appropriate than multiple regression (Kline 2005), even though most of the constructs were assessed with single indicators. Four different structural equation models were estimated, two models each for out-degree centrality and in-degree centrality. Model-1 examined out-degree centrality, stress and satisfaction all measured at T1; in Model-2, out-degree centrality, stress and satisfaction were all measured at T2. Similarly, Models 3 and 4 were created for in-degree centrality. For H4 and H5 (the moderating hypotheses), we created a new construct by multiplying PP with out-degree (for Models 1, and 2) and with in-degree (for models 3 and 4).

We used path analysis for modeling the interaction because it does not require calculation and specification of nonlinear constraints. However, when path analysis is used for testing interactions, the measurement model is

sacrificed and it may result in biased estimates of regression coefficients. Therefore, in order to achieve statistical conclusion validity, we used the latent moderated structural (LMS) equations approach (see Klein and Moosbrugger 2000) using the Mplus software (Muthen and Muthen 2008). For this analysis, we modeled proactive personality, satisfaction and stress as multi-item latent variables and operationalized out-degree (in-degree) ties as a single item latent variable. This procedure is believed to provide more accurate and precise estimates as it does not violate normality assumptions that may be violated in the constrained error approach (Klein and Muthen 2007). Using this technique, we obtained similar results; however, we opted for presenting only the results obtained through the path analysis to avoid redundancy.

Furthermore, we controlled for gender and race in our SEM analysis as research has shown that the extent to which people derive benefits from their structural positions in a social network may differ based on demographic differences (Mehra et al. 1998).

Results

Means, standard deviation, and zero-order correlations among variables at T1 and T2 are reported in Table 1. The combined sample ($N = 159$) included 100 males and 59

females. Average in-degree and out-degree centrality for females at T1 (T2) were 2.58 (3.71) and 1.83 (3.32), respectively. Average in-degree and out-degree centrality for males at T1 (T2) were 2.40 (4.07) and 2.84 (4.30), respectively. Additionally, the sample included 84 whites and 75 minorities. The average in-degree and out-degree centrality for whites at T1 (T2) were 2.49 (3.92) and 2.39 (3.74), respectively. The average in-degree and out-degree centrality for minorities at T1 (T2) were 2.44 (3.96) and 2.55 (4.16), respectively.

At T1, the total number of ties in the network was 392, with an average of 2.47 in-degree and 2.47 out-degree ties, meaning that on average, an individual had 2.47 ties. At T2, the total number of ties in the network was 626, with an average of 3.94 in-degree and 3.94 out-degree ties. SIENA analysis (Table 2) yielded a significant network rate parameter ($t = 12.71$, $P < 0.001$), which indicates a significant change in the network structure via the microsteps (addition, severing, or maintaining of network ties) that actors took between the two time points. Second, network centralization values increased from 0.04 at T1 to 0.71 at T2, suggesting that more ties were formed near the central actors. In addition, the density of the network increased from 0.016 at T1 to 0.025 at T2 (significantly different according to bootstrap analysis at $P < 0.001$), which indicated an increase over time in the ratio of actual ties to all possible ties. Together, these findings demonstrate that

Table 1 Overall means, standard deviations, and zero-order correlations

	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9	10	11
1. Proactive personality T1	4.54 (0.783)	1										
2. In-degree centrality T1	2.47 (2.00)	0.04	1									
3. In-degree centrality T2	3.94 (2.60)	0.08	0.57**	1								
4. Out-degree centrality T1	2.47 (2.79)	0.01	0.28**	0.37**	1							
5. Out-degree centrality T2	3.94 (3.75)	−0.02	0.26**	0.44**	0.51**	1						
6. Satisfaction T1	5.22 (0.704)	0.246**	0.05	0.07	0.07	0.02	1					
7. Satisfaction T2	4.76 (1.12)	0.314**	0.05	−0.04	0.04	−0.02	0.30**	1				
8. Stress T1	4.60 (1.17)	−0.06	0.02	−0.04	−0.04	−0.07	0.03	0.02	1			
9. Stress T2	4.36 (1.12)	−0.03	−0.11	−0.21*	−0.19*	−0.10	−0.08	0.18*	0.43**	1		
10. Gender (0 = female, 1 = male)	NA	0.09	−0.04	0.07	0.18*	0.13	0.07	0.04	−0.04	−0.05	1	
11. Race (0 = white, 1 = minority)	NA	0.02	−0.01	0.01	0.03	0.06	−0.08	−0.05	0.04	−0.05	−0.11	1

Significance levels ** $P < 0.01$, * $P < 0.05$

Table 2 SIENA estimation results in the close friendship network

Parameters	Estimates	SE	<i>t</i> value (<i>P</i> value)
Basic network rate parameter	32.962	1.911	17.25 (<0.001)***
Out-degree	−0.299	0.028	10.80 (<0.001)***
Reciprocity	1.260	0.055	22.74 (<0.001)***
Transitive triplets	0.165	0.036	4.61 (<0.001)***
3-Cycles	−0.103	0.034	3.00 (<0.01)**
Out–out degree ^{1/2} assortativity	−0.061	0.009	6.77 (<0.001)***
Proactive personality ego	0.042	0.028	1.51 (n.s.)
Proactive personality alter	0.041	0.025	1.63 (n.s.)
Proactive personality similarity (H1)	−0.403	0.118	3.41 (<0.001)***

Significance levels

*** $P < 0.001$, ** $P < 0.01$

the number of close friendships has increased from T1 to T2.

Hypothesis 1 predicted that proactive individuals form ties with other individuals who are less proactive than themselves. SIENA analysis tests this hypothesis by assessing the PP similarity parameter. The SIENA analysis resulted in a negative PP similarity parameter ($t = -3.41$, $P < 0.01$) (Table 2) which indicates that proactive individuals over time formed ties with less proactive individuals.

To test Hypotheses 2 and 3, Fig. 3a, b contain the results of two separate SEM models. Models 1 and 2 examined the effects of out-degree centrality, and models 3 and 4 examined the effects of in-degree centrality. The first entry (top) beta coefficient indicates the results for Model 1 (Model 3 for in-degree centrality), when centrality and outcomes were assessed at T1 (T1 cross-section). The second entry (bottom) beta coefficient indicates the results for Model 2 (Model 4 for in-degree centrality), when centrality and outcomes were measured at T2 (T2 cross-section). In all cases, PP was measured at T1.

The robustness of models is presented in Table 3. As indicated by the non-significant χ^2 test, all the models fit the data very well, i.e. there was no significant departure of the data from the models. The χ^2 values ranged from 2.24 (Model 3, P value 0.79) to 6.95 (Model 2, P value 0.18) and is one of the most stringent tests of model robustness (Mulaik et al. 1989). As an additional robustness test, all of the models tested had fit indices better than the recommended levels (i.e., >0.95 for GFI and CFI, and <0.06 for RMSEA and RMR, see Kline 2005). Thus, these models fit the data reasonably well.

H2, which predicted a positive relationship between out-degree centrality and stress, was not confirmed by our model ($\beta = 0.07$, n.s. at time 1; $\beta = 0.04$, n.s. at time 2; see Fig. 3a). Confirming H4, proactive personality did not moderate the relationship between out-degree centrality and stress measured at T1 ($\beta_{11} = 0.04$, n.s.); however, it did moderate the relationship in T2 ($\beta_{12} = 0.13$, $P = 0.05$). Thus, the data show that the moderating role of

PP becomes significant over time. In addition, following Qureshi and Compeau (2009), we performed model constraint tests, which showed that constraining β_{11} as equal to β_{12} significantly reduced the fit of the overall model, as indicated by significantly larger χ^2 statistics, suggesting that β_{12} is significantly larger than β_{11} . In contrast, the results for in-degree ties did not hold. In-degree centrality did not predict stress and proactive personality did not moderate the relationship (see Fig. 3b).

H3, which predicted the positive relationship between out-degree centrality and satisfaction, was confirmed by our model ($\beta = 0.18$, $P < 0.05$ at time 1; $\beta = 0.12$, $P < 0.1$ at time 2; see Fig. 3a). Confirming H5, proactive personality did not moderate the relationship between out-degree centrality and satisfaction measured at T1 ($\beta_{21} = 0.06$, n.s.); however, it did moderate the relationship at T2 ($\beta_{22} = 0.14$, $P < 0.05$). In addition, following Qureshi and Compeau (2009), we performed model constraint tests, which showed that constraining β_{21} as equal to β_{22} significantly reduced the fit of the overall model, as indicated by significantly larger χ^2 statistics, suggesting β_{22} is significantly larger than β_{21} . In contrast, the results for in-degree ties did not yield similar results. In-degree centrality did not predict satisfaction and proactive personality did not moderate the relationship (see Fig. 3b).

General Discussion

Our longitudinal network study reveals that similarities in proactive personality reduce the likelihood of friendship ties in social networks. While past research has identified several attributes where similarity enhances the likelihood of friendship ties, our findings reveal that proactive personality similarity inhibits tie formation in later stage social networks. These findings provide evidence that while similarities in ethnicity, values, and attitudes, for example, bring people together in social relationships (e.g., McPherson et al. 2001), proactive personality may motivate individuals to seek out less proactive people for social

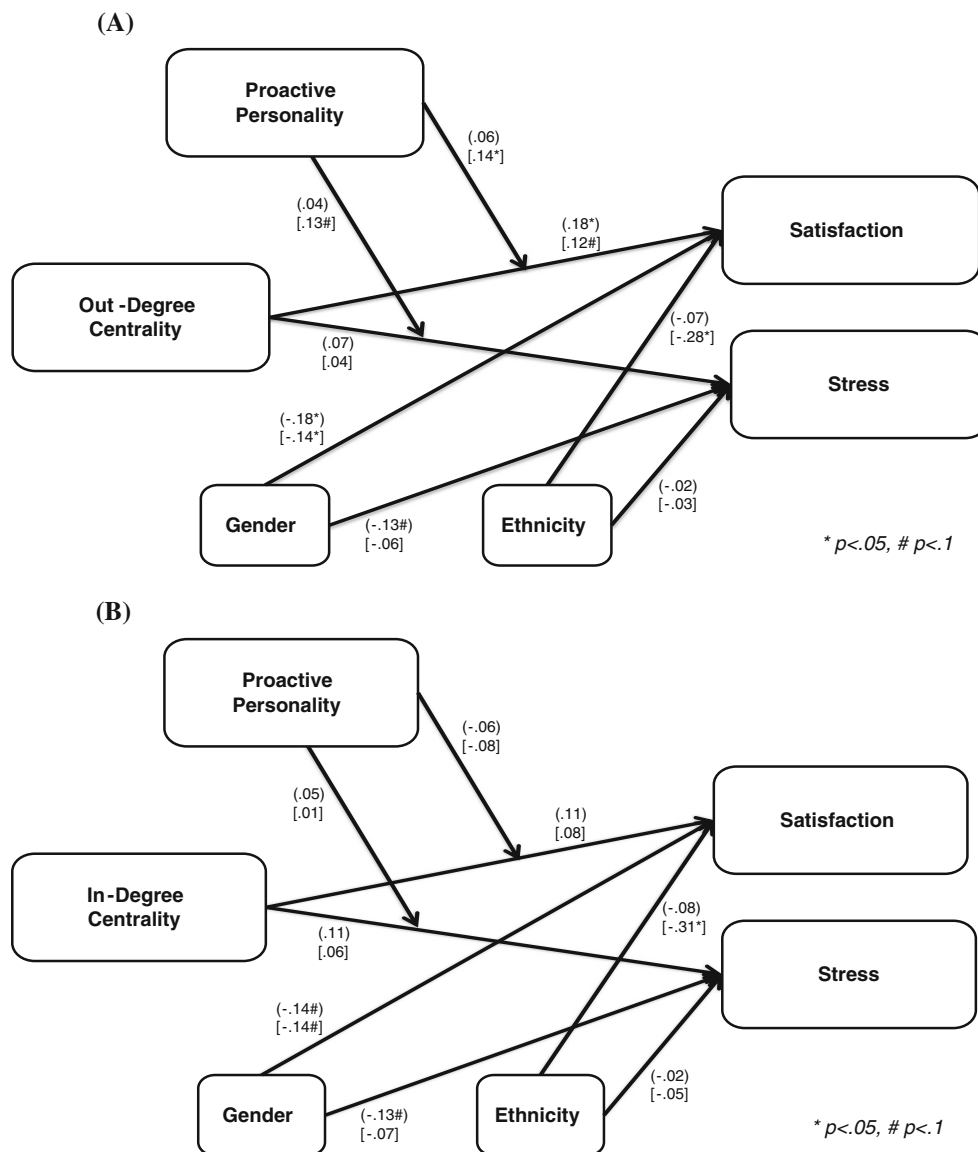


Fig. 3 **a** SEM results for out-degree centrality: (Model 1—T1) and [Model 2—T2], **b** SEM results for in-degree centrality: (Model 3—T1) and [Model 4—T2]

Table 3 Fit indices for all SEM models

	Model-1 (T1-outdegree, T1-stress, T1-satis.)	Model-2 (T2-outdegree, T2-stress, T2-satis.)	Model-3 (T1-indegree, T1-stress, T1-satis.)	Model-4 (T2-indegree, T2-stress, T2-satis.)
χ^2	3.357	6.295	2.242	5.521
df	5	5	5	5
<i>P</i> value	0.645	0.178	0.788	0.238
CFI	0.999	0.956	0.999	0.958
GFI	0.994	0.989	0.996	0.990
RMR	0.026	0.038	0.012	0.031
RMSEA	0.001	0.060	0.001	0.049

relationships over time. Our paper is among the first to provide evidence of personality heterophily over time (relationships form because of differences in personality). The findings enhance our understanding of role of personality similarity in shaping patterns of social networks.

Moreover, we explored the relationship between centrality in friendship networks and stress. Specifically, we suggested that competing arguments exist in support of as well as against the relationship. Results of our analysis revealed a lack of relationship between network centrality and stress. However, based on the conservation of resources theory (Hobfoll 1989, 2001) and expanded demand–control model of workplace (Karasek 1979; Rubino et al. 2012), we predicted that proactive personality would moderate the relationship between stress and network centrality, such that proactive individuals experience stress when occupying central positions in friendship networks. Consistent with our reasoning, the relationship between stress and network centrality (out-degree) was stronger for highly proactive individuals than for less proactive individuals. However, this finding was obtained at a later point in time, specifically at T2 when the network had become more developed. Part of the reason that the identification of the downside of network centrality is quite limited in empirical research may be because the relationship between network centrality and negative outcomes (e.g., stress) is complex and limited by boundary conditions. Proactive personality is one contingency important to the relationship between centrality in social networks and stress such that the relationship between centrality and stress is stronger for highly proactive personalities.

Our findings constructively replicate earlier findings on the positive relationship between network centrality and satisfaction (see Baldwin et al. 1997). While prior research used a cross-sectional research design, we were able to replicate the findings using a longitudinal design. Interestingly, we did not find a positive relationship between in-degree centrality and satisfaction. These findings suggest that use measures of a perceptual measure (out-degree centrality) may be a better predictor of key psychological outcomes than a measure of direct incoming ties (in-degree centrality). Further, our findings reveal proactive personality moderated the relationship between centrality (out-degree) and satisfaction. However, this finding was obtained only at a later point in time, specifically at T2 when the network had become more developed. Hence, for proactive individuals, more strategic and active use of the network did not create satisfaction immediately, but by T2, as the network developed, the results of those network-building efforts garnered greater satisfaction. These findings suggest that proactive personality enhances the centrality–satisfaction relationship as individuals gain opportunities to gather information from network contacts, and act on the information to create satisfying outcomes.

Proactive personality is important to both the benefits and costs associated with network participation, suggesting that proactive personality has paradoxical effects. Proactive personalities who are central in friendship networks are prone to experiencing both higher satisfaction and greater stress. Prior research on proactive personality has primarily focused on its benefits (e.g., Crant 1995; Seibert et al. 1999) and scholars have called for more empirical evidence on the potential negative consequences of proactive personality (Bolino et al. 2010). Our findings contribute to this area of research by empirically demonstrating that, over time, proactive individuals in central positions experience greater stress. Social network research in the past has largely focused on positive outcomes associated with network centrality or has examined networks of negative ties (e.g., hindrance networks) and the relationship between centrality in negative tie networks and negative outcomes (Labi-anca et al. 1998). However, focus on relating network centrality in friendship networks to individual-level negative outcomes has been limited. Our study points clearly to the downside of network centrality in friendship networks in particular for highly proactive individuals.

Further, our research points to personality as a boundary condition on the benefits derived from central positions in social networks. While social network research has identified a range of benefits associated with network centrality, the boundary conditions driven by personality differences have rarely been examined. Our findings challenge the purely structural arguments (Wellman and Berkowitz 1988; White 1992) that suggest that benefits of networks are embedded in structural network positions (e.g., central positions) and individual differences are immaterial in the realization of these benefits. Specifically, our findings clearly reveal that highly proactive individuals have stronger linkages between centrality and satisfaction as well as between centrality and stress than less proactive individuals. Our findings also point to the need to move beyond a focus strictly on main effects toward a greater examination of moderated models. In the current paper, we did not find a direct relationship between centrality and stress, and yet proactive personality moderated the relationship enabling us to understand the interplay of proactive personality and network centrality on stress.

Finally, it is important to note that people's perceptions of their friendships (out-degree ties) were more strongly related to their satisfaction than their actual friendships, as reported by others (in-degree ties). This finding is in part consistent with the reflection–construction model of social reality (Jussim 1991), as people's perceptions of their social network rather than their actual status in the network were associated with satisfaction. But, neither out-degree centrality nor in-degree centrality were related to stress in the program.

This study has its inevitable limitations. Although our sample was composed of students, we believe that students are just as capable as the working population to engage in active networking behavior in order to enhance access to information and resources. However, to increase generalizability, future research should consider replicating this study in corporate settings to increase the external validity of the findings. Further, consistent with other network studies, this study suffers from an artificial boundary to the social network studied, notwithstanding that our boundary in this study was reasonable as all of our respondents were students entering into a common program.

We also acknowledge that personal friendship networks outside the group can influence the level of satisfaction and stress experienced by individuals. However, despite this obvious limitation of our study, the sample we used has important advantages. The impact of personality is best observed in a group of individuals brought together into the same setting at the same time. Because all members entered the social context simultaneously, in our network, the influence of personality was documented in a way that is free from the impact of any history or tenure distribution effects (Zenger and Lawrence 1989). Also, most of this population's time is spent together in a lock-step program where they take the same core classes together 25 h a week. As a result, a large proportion of the friendship ties that do develop are with other members of the entering cohort rather than with any other students, such as students in other programs or more senior students. Hence, all individuals in the population have about the same opportunities to create a store of social resources in the program, and the impact of proactive personality is not confounded with opportunities to interact or timing of entry into the network, thus enhancing the internal validity of the research.

Given the lack of research in this area, we encourage future researchers to explore and identify additional individual and situational characteristics that enhance the benefits or costs of occupying central network positions. We call for more empirical research in the area of proactive personality as we have discovered its positive and negative impacts on personal outcomes in social networks. In fact, given the paradoxical outcome, it would be interesting to identify the coping mechanisms proactive individuals undertake to find balance between their positive and negative outcomes. Furthermore, it would be interesting to see whether individuals accrue more stress or satisfaction as networks mature. Studies have shown that experience reduces role overload, and thus, the potential exists for decreased stress through adaptation (Jones et al. 2007). Therefore, the level of individual stress could subside once individuals gain even more experience with the network. Future research should explore these related ideas.

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References

- Antonucci, T. C., Akiyama, H., & Lansford, J. E. (1998). Negative effects of close social relations. *Family Relations*, 47, 379–384.
- Baldwin, T. T., Bedell, M. D., & Johnson, J. L. (1997). The social fabric of a team-based MBA program: Network effects on student satisfaction and performance. *Academy of Management Journal*, 40, 1369–1397.
- Bartoo, H., & Sias, P. M. (2004). When enough is too much: Communication apprehension and employee information experiences. *Communication Quarterly*, 52, 15–26.
- Batagelj, V., & Bren, M. (1995). Comparing resemblance measures. *Journal of Classification*, 12, 73–90.
- Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior*, 14, 103–118.
- Belliveau, M. A. (2005). Blind ambition? The effects of social networks and institutional sex composition on the job search outcomes of elite coeducational and women's college graduates. *Organizational Science*, 16, 134–150.
- Boer, P., Huisman, M., Snijders, T. A., Steglich, C., Wichers, L., & Zeggelink, E. (2007). *StOCNET: An open software system for the advance statistical analysis of social networks*. Groningen: ICS/Science Plus.
- Bolino, M. C., & Turnley, W. H. (2005). The personal costs of citizenship behavior: The relationship between individual initiative and role overload, job, and work–family conflict. *Journal of Applied Psychology*, 90, 740–748.
- Bolino, M. C., Valcea, S., & Harvey, J. (2010). Employee, manage thyself: The potentially negative implications of expecting employees to behave proactively. *Journal of Occupational and Organizational Psychology*, 83, 325–345.
- Brass, D. J. (1985). Men's and women's networks: A study of interaction patterns and influence in an organization. *Academy of Management Journal*, 28, 327–343.
- Brass, D. J. (2012). A social network perspective on organizational psychology. In S. W. J. Kozlowski (Ed.), *The Oxford handbook of organizational psychology* (pp. 667–695). New York: Oxford University Press.
- Brass, D. J., & Burkhardt, M. E. (1993). Potential power and power use: An investigation of structure and behavior. *Academy of Management Journal*, 36, 441–470.
- Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal*, 47, 795–817.
- Brown, G., Lawrence, T. B., & Robinson, S. L. (2005). Territoriality in organizations. *Academy of Management Review*, 30, 577–594.
- Buchan, N. R., Crosron, R. T., & Dawes, R. (2002). Swift neighbors and persistent strangers: A cross-cultural investigation of trust and reciprocity in social exchange. *American Journal of Sociology*, 108, 168–206.
- Burk, W. J., Steglich, C., & Snijders, T. A. (2007). Beyond dyadic interdependence: Actor-oriented models for co-evolving social networks and individual behaviors. *International Journal of Behavioral Development*, 31, 397–404.
- Burkhardt, M. E., & Brass, D. J. (1990). Changing patterns or patterns of change: The effect of a change in technology on social

- network structure and power. *Administrative Science Quarterly*, 35, 104–127.
- Casciaro, T. (1998). Seeing things clearly: Social structure, personality, and accuracy in social network perception. *Social Networks*, 20, 331–351.
- Crant, J. M. (1995). The proactive personality scale and objective job performance among real estate agents. *Journal of Applied Psychology*, 80, 532–537.
- Crant, J. M. (2000). Proactive behavior in organizations. *Journal of Management*, 26, 435–462.
- Eilam, G., & Shamir, B. (2005). Organizational change and self-concept threats: A theoretical perspective and a case study. *Journal of Applied Behavioral Science*, 41, 399–421.
- Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks*, 1, 215–239.
- Gest, S. D., Graham-Bermann, S. A., & Hartup, W. W. (2001). Peer experience: Common and unique features of number of friendships, social network centrality, and sociometric status. *Social Development*, 10, 23–40.
- Gibbons, D., & Olk, P. M. (2003). Individual and structural origins of friendship and social position among professionals. *Journal of Personality and Social Psychology*, 84, 340–351.
- Hayward, R. D., & Elliott, M. (2011). Subjective and objective fit in religious congregations: Implications for well-being. *Group Processes & Intergroup Relations*, 14, 127–139.
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt to conceptualizing. *American Psychologist*, 44, 513–524.
- Ibarra, H. (1992). Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly*, 37, 422–447.
- Ibarra, H. (1993). Personal networks of women and minorities in management: A conceptual framework. *Academy of Management Review*, 18, 56–87.
- Jones, E., Chonko, L., Rangarajan, D., & Roberts, J. (2007). The role of overload on job attitudes, turnover intentions, and salesperson performance. *Journal of Business Research*, 60, 663–671.
- Jussim, L. (1991). Social perception and social reality: A reflection–construction model. *Psychological Review*, 98, 54–73.
- Karasek, R. A., Jr. (1979). Job demands, job decision latitude, and mental stress: Implications for job redesign. *Administrative Science Quarterly*, 24, 285–308.
- Kenny, D. A., & Judd, C. M. (1994). Estimating the nonlinear and interactive effects of latent variables. *Psychological Bulletin*, 96, 201–210.
- Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. In J. P. Walsh & A. P. Brief (Eds.), *Academy of management annals* (Vol. 4, pp. 317–357). Routledge: Taylor and Francis.
- Kilduff, M., & Krackhardt, D. (1994). Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy of Management Journal*, 37, 87–108.
- Klein, A., & Moosbrugger, H. (2000). Maximum likelihood estimation of latent interaction effects with the LMS method. *Psychometrika*, 65, 457–474.
- Klein, A., & Muthen, B. O. (2007). Quasi-maximum likelihood estimation of structural equation models with multiple interaction and quadratic effects. *Multivariate Behavioral Research*, 42, 647–673.
- Klein, K. J., Lim, B.-C., Saltz, J., & Mayer, D. M. (2004). How do they get there? An examination of the antecedents of centrality in team networks. *Academy of Management Journal*, 47, 952–963.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling*. New York: Guilford.
- Labianca, G., Brass, D. J., & Gray, B. (1998). Social networks and perceptions of intergroup conflict: The role of negative relationships and third parties. *Academy of Management Journal*, 41, 55–67.
- Lee, S. H., Cotte, J., & Noseworthy, T. (2010). The role of network centrality in the flow of consumer influence. *Journal of Consumer Psychology*, 20, 66–77.
- Lospinoso, J. A., & Snijders, T. A. B. (2011). *Goodness of fit for stochastic actor oriented models*. St. Pete's Beach: Sunbelt XXXI.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415–444.
- Mehra, A., Kilduff, M., & Brass, D. J. (1998). At the margins: A distinctiveness approach to the social identity and social networks of underrepresented groups. *Academy of Management Journal*, 41, 441–452.
- Mehra, A., Kilduff, M., & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly*, 46, 121–146.
- Mick, D. G., Broniarczyk, S. M., & Haidt, J. (2004). Choose, choose, choose, choose, choose, choose, choose: Emerging and prospective research on the deleterious effects of living in consumer hyperchoice. *Journal of Business Ethics*, 52, 207–211.
- Motowidlo, S. J., Packard, J. S., & Manning, M. R. (1986). Occupational stress: Its causes and consequences for job performance. *Journal of Applied Psychology*, 71, 616–629.
- Mulaik, S., James, L., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin*, 105, 430–445.
- Muthen, L., & Muthen, B. O. (2008). *Mplus user's guide: Statistical analysis with latent variables* (5th ed.). Los Angeles: Muthen & Muthen.
- Perry-Smith, J. E. (2006). Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal*, 49, 85–101.
- Qureshi, I., & Compeau, D. (2009). Assessing between-group differences in information systems research: A comparison of covariance- and component-based SEM. *MIS Quarterly*, 33, 197–214.
- Ripley, R. M., Snijders, T. A. B., & Preciado, P. (2012). *Manual for RSiena*. Oxford: University of Oxford.
- Rubino, C., Perry, S. J., Miilam, A. C., Spitzmueller, C., & Zapf, D. (2012). Demand–control–person: Integrating the demand–control and conservation resources models to test an expanded or–stress model. *Journal of Occupational Health Psychology*, 17(4), 456–472.
- Scott, J. (2000). *Social network analysis: A handbook*. London: Sage Publications.
- Seibert, S. E., Crant, J. M., & Kraimer, M. L. (1999). Proactive personality and career success. *Journal of Applied Psychology*, 84, 416–427.
- Seidel, M.-D., Polzer, J. T., & Stewart, K. J. (2000). Friends in high places: The effects of social networks on discrimination in salary negotiations. *Administrative Science Quarterly*, 45, 1–24.
- Sikora, P. B., Beaty, E. D., & Forward, J. (2004). Updating theory on organizational: The asynchronous multiple overlapping change (AMOC) model of workplace. *Human Resource Development*, 3, 3–35.
- Snijders, T. A., Steglich, C., Schwinberger, M., & Huisman, M. (2007). Manual for SIENA version 3.1. ICS/Department of Sociology, University of Groningen; Department of Statistics, University of Oxford.
- Snijders, T., Van De Bunt, G., & Steglich, C. (2010). Introduction to actor-based models for network dynamics. *Social Networks*, 32, 44–60.
- Sparrowe, R. T., Liden, R. C., Wayne, S. J., & Kraimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal*, 44, 316–325.
- Steglich, C., Snijders, T. A., & West, P. (2006). Applying SIENA: An illustrative analysis of the coevolution of adolescents' friendship

- networks, taste in music, and alcohol consumption. *European Journal of research Methods for the Behavioral and Social Sciences*, 2, 48–56.
- Thompson, J. A. (2005). Proactive personality and job performance: A social capital perspective. *Journal of Applied Psychology*, 90, 1011–1017.
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, MA: Cambridge University Press.
- Wellman, B., & Berkowitz, S. D. (1988). *Social structures: A network approach*. New York: Cambridge University Press.
- White, H. C. (1992). *Identity and control: A structural theory of social action*. Princeton, NJ: Princeton University Press.
- Zenger, T. R., & Lawrence, B. S. (1989). Organizational demography: The differential effects of age and tenure distributions on technical communication. *Academy of Management Journal*, 32, 353–376.